

Getting Access to MATLAB and Its Alternatives

Purchase MATLAB (\$50 or \$100)

This is the most convenient but also most costly way to have access to MATLAB. See MathWorks website here: <https://www.mathworks.com/store/link/products/student>. On this page, you will see 2 options at the top:

The screenshot shows the MathWorks Store interface. On the left is a navigation menu with items like 'Product Cart', 'Purchase Products', 'Licenses', 'Quotes', 'Pricing', 'How to Buy', 'FAQ', and 'Support'. The main content area is titled 'Products for MATLAB Student R2014a'. It features a table with columns for 'Product', 'Price', and 'Add to Cart'. Two products are listed under the 'Core Product' section: 'MATLAB and Simulink Student Suite' priced at USD \$99.00, and 'MATLAB Student' priced at USD \$50.00. Red arrows labeled '1' and '2' point to these two rows. Below the table, there is a 'Parallel Computing' section with a 'Parallel Computing Toolbox' option priced at USD \$29.00. A 'Continue' button is visible in the top right of the product list area.

The second one is sufficient for this class, but if you think you will use MATLAB a lot in the future, the first option is a great deal. (You can scroll down to see how much MathWorks charges you for each toolbox.)

You can also go to Stanford Bookstore and purchase a physical copy of MATLAB. However, they only carry the older version (R2013a) of MATLAB and Simulink Student Suite, and it is priced at \$99.95. I can't really recommend this option.

Use MATLAB on Stanford FarmShare (Free)

Stanford provides a campus-wide MATLAB license that everyone can connect to. For more information about Stanford FarmShare, visit https://www.stanford.edu/group/farmshare/cgi-bin/wiki/index.php/Main_Page.

Mac and Linux

Open your terminal and type

```
ssh -Y yoursunetid@corn.stanford.edu
```

You will then be asked to type in your password. Once your log-in information has been verified, you will see a big "FarmShare" logo on your terminal. Type in the following 2 lines:

```
module load matlab
matlab
```

MATLAB should be starting now.

Windows

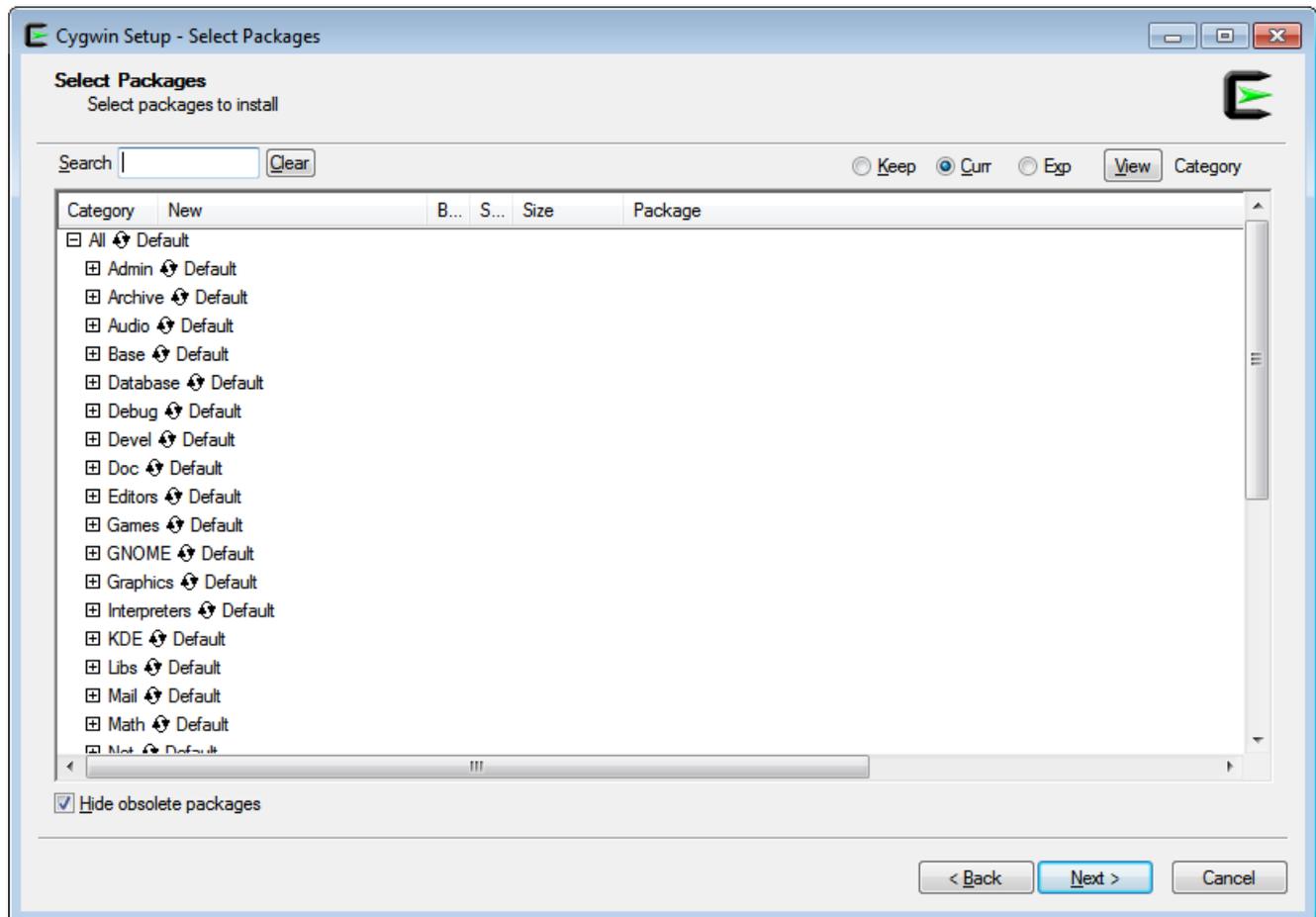
For Windows users, connecting will be a little complicated. I will give you one of many ways to achieve this.

Download Cygwin setup file from <http://www.cygwin.com/install.html>. Pick the version according to your Windows version (32-bit or 64-bit). Once the download is complete, run the setup file you just downloaded.

When asked for a download source, choose “Install from Internet”.

When asked for a connection type, choose either “Direct Connection” or “Use Internet Explorer Proxy Settings”. (Your choice does not really matter.) After you click “Next”, you will be asked to choose a download site. This also does not really matter. Just pick anything.

The crucial part is the “Select Packages” step. The window looks like this:



At the top, there is a “Search” box. Type in “xinit” and click the plus sign in front of “X11”. You’ll see “Skip” below X11. This says that the package “xinit” is not included in the installation by default. Click it to include it.

Category	New	B...	S...	Size	Package
[-] All	Default				
[-] Debug	Default				
[-] X11	Default				
	Skip	n/a	n/a	42k	xinit: X.Org X server launcher

Click here

“Skip” will change to the version number to be installed.

Category	New	B...	S...	Size	Package
[-] All	Default				
[-] Debug	Default				
[-] X11	Default				
	1.3.2-1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	42k	xinit: X.Org X server launcher

This means “xinit” package will be installed.

We need will need more packages, so go back to the search box and type “openss”. Click the plus sign in front of “Net” and choose to install “openssh” and “openssl”.

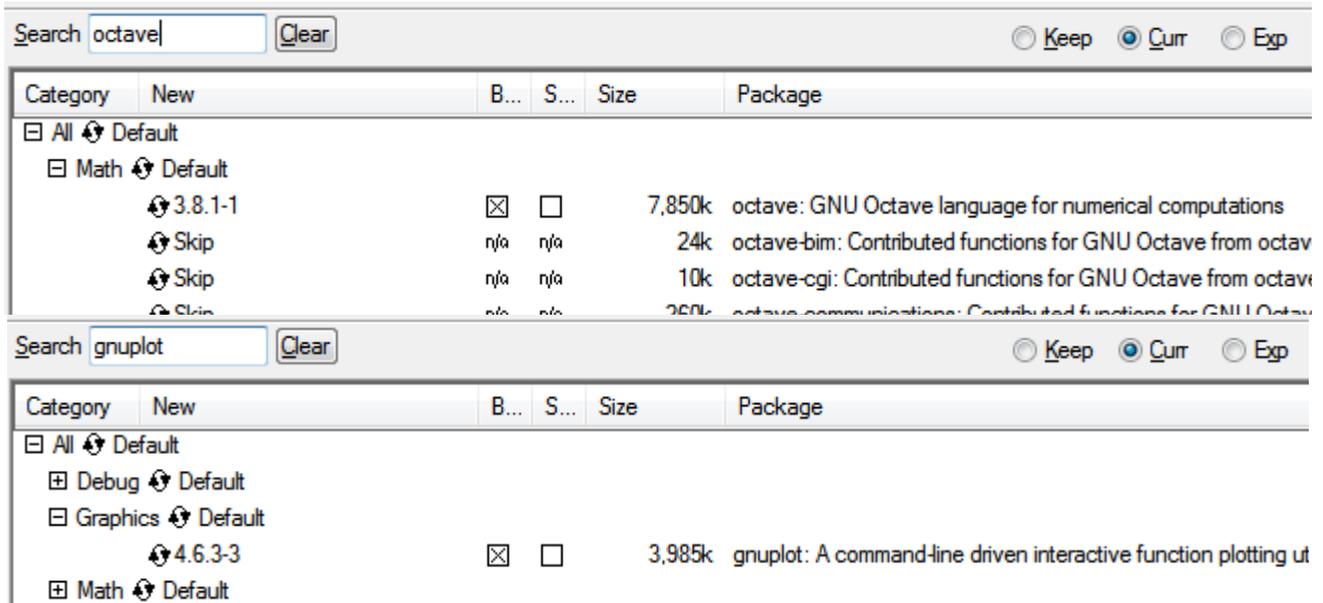
Search Keep Curr

Category	New	B...	S...	Size	Package
[-] All	Default				
[-] Debug	Default				
[-] Devel	Default				
[-] Net	Default				
	Skip	n/a	n/a	766k	libopenssl100: A general purpose cryptography toc
	Skip	n/a	n/a	722k	openssh: The OpenSSH server and client program
	Skip	n/a	n/a	416k	openssl: A general purpose cryptography toolkit wi
	Skip	n/a	n/a	1,336k	openssl-devel: A general purpose cryptography toc
[-] Python	Default				

Install these

Category	New	B...	S...	Size	Package
[-] All	Default				
[-] Debug	Default				
[-] Devel	Default				
[-] Net	Default				
	Skip	n/a	n/a	766k	libopenssl100: A general purpose cryptography toc
	6.6p1-1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	722k	openssh: The OpenSSH server and client program
	1.0.1f-3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	416k	openssl: A general purpose cryptography toolkit wi
	Skip	n/a	n/a	1,336k	openssl-devel: A general purpose cryptography toc
[-] Python	Default				

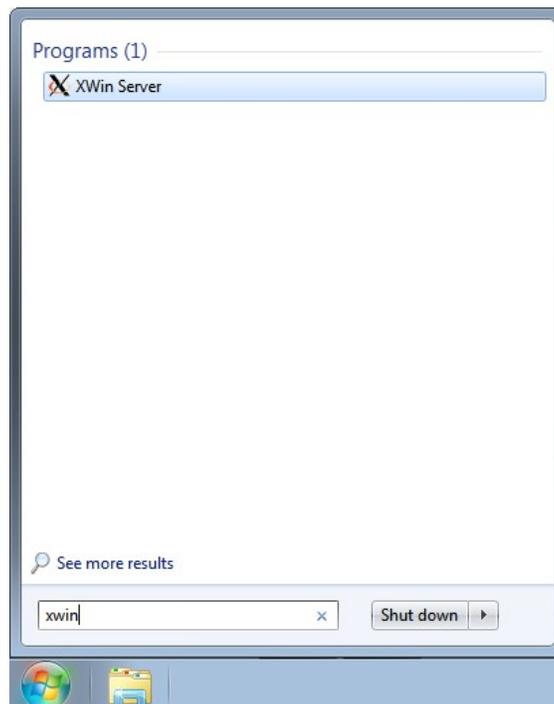
Recommended optional packages: You can also install Octave, a free alternative to MATLAB, at this stage. Necessary packages for Octave are named “octave” and “gnuplot”. See the following pictures:



Now you are ready to install. Click “Next” at the bottom and keep following the instruction until the installation is complete.

If you want to add/remove/change these packages later, you can do so by running Cygwin’s setup file (which you downloaded) again.

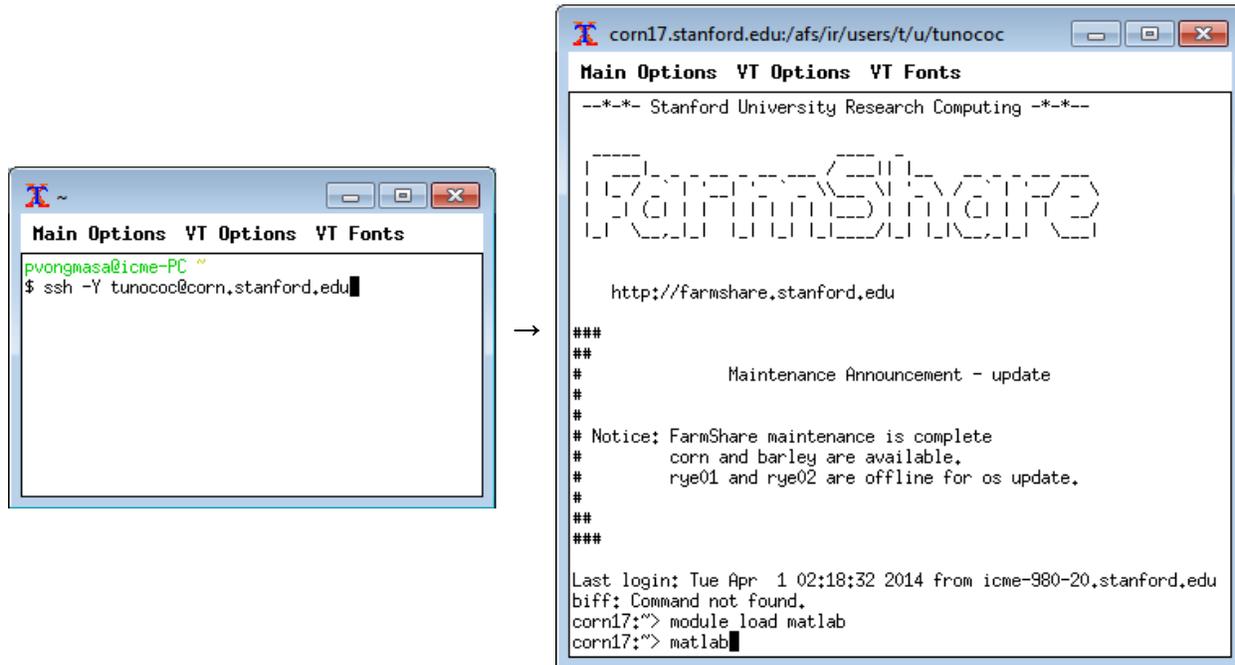
This installation step needs to be done only once. With Cygwin installed, you can connect to FarmShare and run MATLAB as follows. Run “XWin Server”, which was supposedly installed with Cygwin.



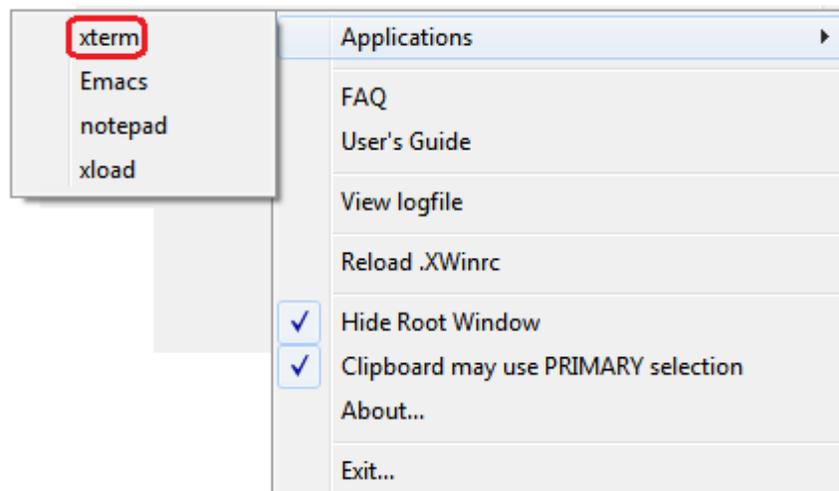
A terminal window will appear and XWin Server icon will appear in the notification area.



Now you can use the terminal window as if you are on Linux, so follow the instruction for Mac and Linux above.



Special remarks: If you close the terminal window, XWin Server will not stop running. To re-open a terminal window, running “XWin Server” again from Start Menu won’t work. You need to right-click on XWin Server icon in the notification bar, choose “Application”, then choose “xterm”. You can repeat this to open as many terminal windows as you want.



Octave (Free)

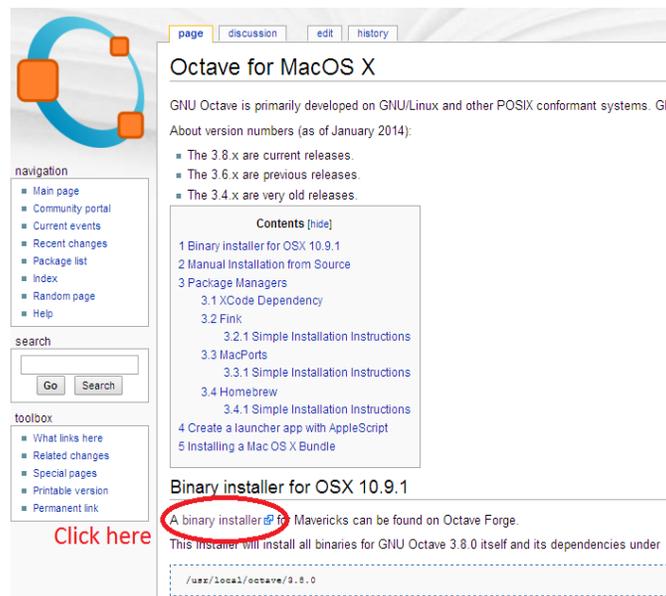
Octave is a very well-developed free alternative to MATLAB. Octave is completely compatible with MATLAB. Because it is free, it is not as good as MATLAB. Some notable disadvantages of Octave are

- Uglier graphical interface
- Harder installation and configuration
- Less smooth interaction (for example, plot windows respond very slowly)

However, it is free, and can be installed on your own machine, unlike MATLAB on FarmShare.

Mac

Go to <http://sourceforge.net/projects/octave/files/Octave%20MacOSX%20Binary/2013-12-30%20binary%20installer%20of%20Octave%203.8.0%20for%20OSX%2010.9.1%20%28beta%29/>. If you're viewing this document on your computer, you can click this URL. Otherwise, go to http://wiki.octave.org/Octave_for_MacOS_X and look for “binary installer” link as shown in the picture below.



You will be brought to Octave Forge page. Download “GNU_Octave_3.8.0-6.dmg” and use it to install. You will have two applications in your Applications folder, namely

```
/Applications/Octave-cli.app  
/Applications/Octave-gui.app
```

The second one is what you want to use.

The wiki page also gives you a guide on how to create a launcher app with AppleScript at the bottom of that page. This is not necessary but is quite nice.

Windows

I recommend that you follow the above instruction on how to connect to FarmShare on Windows and also include the optional packages “octave” and “gnuplot”. This is the best way to install Octave for Windows. To run Octave, have XWin Server running and type `octave --force-gui` in the terminal.

FreeMat (FREE)

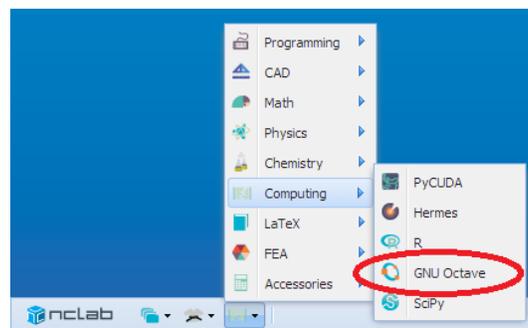
FreeMat is a newer but less mature MATLAB alternative than Octave. It is, however, extremely easy to install. Visit <http://freemat.sourceforge.net/> to get it.

Because FreeMat is less mature, some visualization functions (such as surf) may not behave as nicely as MATLAB and Octave. If you choose to use FreeMat, I will address some differences between FreeMat and MATLAB later.

NCLab (Cloud Service)

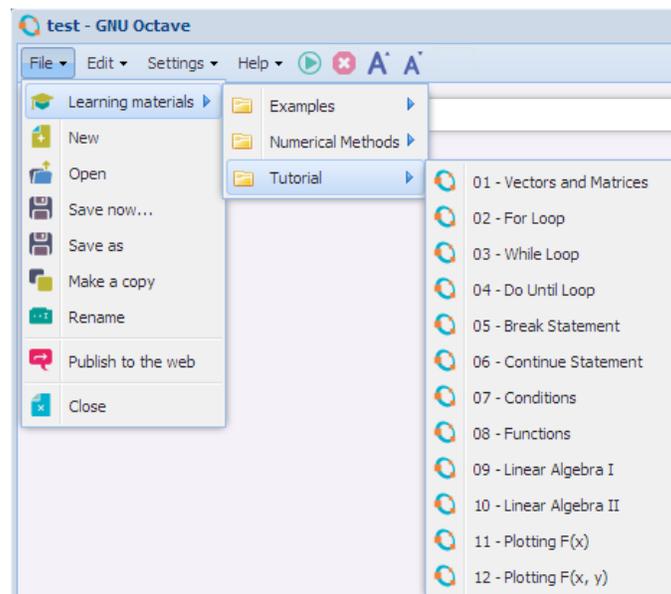
NCLab is a cloud service for many programming languages. That means you save and run your work on NCLab's website: <https://nclab.com/>.

A free NCLab account gives you 100MB and 30 minutes of CPU time per day, which is supposedly sufficient for this class (if your code is not too far from being correct). Octave is an application inside NCLab workspace listed under the group "Computing".



Because NCLab is a web-based environment, it can be slow at updating your files. That means if you've just finished creating an m file, you might not be able to use it from another m file right away. Also keep in mind that Octave on NCLab is still experimental (beta) so when there's something weirdly wrong, it might not be your fault.

One nice thing about NCLab is it is also focused on learning. You can find some learning materials here:



Octave on NCLab executes in batches, which means you don't get an interactive command window like you would with other options. This makes it difficult to play around with functions when you're just testing their behaviors by changing arguments. Also, plots are not interactive. You cannot scale or rotate the plots once they are produced.

My Opinion

Here's the summary of all the five options I've presented.

	Purchased MATLAB	MATLAB on FarmShare	Octave	FreeMat	NCLab
Cost	\$99 or \$50	Free	Free	Free	Free or monthly subscription (\$10 or \$50)
Installation	Easy	Mac/Linux: Not Required Windows: Hard	Mac: Easy Linux: Varies Windows: Hard	Easy	Not Required
Running	Easy	Mac/Linux: ssh Windows: XWin and ssh	Mac/Linux: Easy Windows: Requires XWin	Easy	Web log-in
Compatibility with MATLAB	Perfect	Perfect	Perfect (and more)	Almost perfect	Perfect (and more)
Interaction with plots	Fast Intuitive	Slow Intuitive	Slow Less Intuitive	Fast Less Intuitive	Not available
Instant computation (console window)	Available	Available	Available	Available	Not available
File Management	Local	Stanford AFS	Local (with mounting)	Local	Cloud (difficult)

If money is not an issue, here's how I rank all the options from most preferable to least preferable:

1. Purchased MATLAB
2. Octave
3. FreeMat
4. Remote MATLAB on FarmShare
5. NCLab

I do, however, recommend that you try all these options. Even if you're not going to use NCLab, the tutorials there are pretty good.

Additional Information on FarmShare and Stanford AFS

If you use FarmShare, your files will be stored on your Stanford AFS account. You can access them via the web interface on afs.stanford.edu or by using OpenAFS software, available for Mac and Windows here: <https://itservices.stanford.edu/service/openafs>. Once OpenAFS is installed and running, you can access your AFS storage like it is another drive on your computer.